

ENVIRONMENTAL ASSESSMENT

For the Future Management of Seven Earthen Dams in Florissant Fossil Beds National Monument

AUGUST 7, 2001

The National Park Service (NPS) is considering alternatives that address the future management of seven earthen dam locations at Florissant Fossil Beds National Monument (FLFO). This EA evaluates three possible management action alternatives and examines the potential impacts that could result from each of the alternatives.

The NPS preferred alternative is the restoration of disturbed land through the removal of the seven earthen dams and subsequent re-vegetation of associated upland and wetland areas with the objective of re-establishing natural hydrologic and geomorphic processes, restoring natural land contours, reclaiming and re-vegetating disturbed areas, and re-establishing wetland structure, function, and hydrology.

**United States Department of the Interior
National Park Service**

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Copies of this EA have been mailed to public libraries in Colorado Springs, Woodland Park, and Florissant, Colorado. This EA is posted on www.nps.gov/flfo and may be e-mailed to a given e-mail address. In order to be considered in the decision making process, comments must be received within 30 days from the date of this EA.

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I. PURPOSE AND NEED

The National Park Service (NPS) is considering possible alternatives that address the future management of seven earthen dam locations at Florissant Fossil Beds National Monument (FLFO). The dam locations are mapped on Figure 1 and are visible in an aerial photograph included as Figure 2. These two figures and close-up photographs of each of the dams are available in the Appendix.

The Florissant Fossil Beds were set aside in 1969 as a part of our National Park System. FLFO encompasses 5,998 acres including the Ancient Lake Florissant basin and surroundings where almost 35 million years ago enormous volcanic eruptions buried the then-lush valley and petrified the redwood trees that grew there. A lake formed in the valley, and the fine-grained sediments at its bottom became the final resting-place for thousands of insects and plants as sediments compacted into layers of shale and preserved the delicate details of these organisms as fossils. FLFO was established for the protection, study, and interpretation of its world-renowned Eocene plant and insect fossils and petrified redwoods. FLFO is located 35 miles west of Colorado Springs in Teller County, one half mile south of the town of Florissant (Figure 1). FLFO is bisected by north/south-trending Teller County Road 1 and is surrounded by subdivisions and privately-owned ranches. Over 80,000 visitors per year visit FLFO to enjoy, understand, and appreciate the significance of its fossil resources.

In the mid-1900s, the Natural Resources Conservation Service [(NRCS) formerly the Soil Conservation Service (SCS)] installed many earthen dams (embankments) throughout the western United States for water retention and erosion control. A total of forty-four earthen dams have been identified on the 5,998 acres comprising the FLFO. The original purpose of the earthen dams was erosion control and water retention and diversion in association with land management and use practices (ranching and farming) at the time of their construction. Since the establishment of the Monument in 1969, land management and use practices are now based on the NPS mission to preserve, research, and interpret the paleontologic and geologic resources, and to preserve the other natural resources for public knowledge and enjoyment.

The 1969 legislation authorizing FLFO mandated its purpose “to preserve and interpret for the benefit and enjoyment of present and future generations the excellently preserved insect and leaf fossils and related geologic sites and objects at the Florissant lakebeds...”. Further, all units of the NPS are bound by the 1916 NPS Organic Act (OA) and the 1970 NPS General Authorities Act (GAA) as amended to conserve park resources and values and to provide for the enjoyment of resources in such manner and by such means as will leave them unimpaired for the enjoyment of future generations. The NPS has established specific policies to guide the parks in this effort. These “Management Policies” specifically state that “The Service will re-establish natural functions and processes in human-disturbed components of natural systems in parks unless otherwise directed by Congress.” (Section 4.1.5 Restoration of Natural Systems). They also state that the NPS will “...seek to deactivate existing (dams) unless they contribute to the

cultural, natural, or recreational bases of the area...” (Section 9.5 Dams and Reservoirs). FLFO’s mission is accomplished through goals outlined in the NPS-approved *Strategic Plan*. The *Strategic Plan* is reviewed and revised every three years and is perpetuated in order to fulfill the requirements of the Government Performance and Results Act (GPRA) passed by the U.S. Congress in 1993 to make the federal government more accountable to the American people in its actions and expenditures.

Read together, the provisions of the 1916 OA, the 1969 authorizing legislation, the 1970 GAA, the NPS Management Policies, and the *Strategic Plan* as guided by the 1993 GPRA jointly commit the NPS to carry out the trust responsibilities related to park resources at FLFO. The goals to sustain the mission of FLFO include the commitment that natural and cultural resources and associated values at FLFO are protected, restored, and maintained in good condition and managed within their broader ecosystem and cultural context. This commitment includes the concept of the perpetuation of natural processes, and addresses threats to natural landscapes at FLFO. As such, one stated goal for the NPS at FLFO includes the restoration of disturbed lands and thus the restoration of ecosystems, natural processes, natural landscapes, and scenic beauty.

Approximately 76 acres of land within the boundaries of FLFO have been disturbed by previous land use, including prior physical developments such as earthen dams, agricultural fields, and homesites. The Monument has set a goal of restoring 20 of the 76 acres of FLFO’s targeted disturbed lands by 2005. In order to carry out the mission of FLFO and fulfill the trust responsibilities related to park resources at FLFO, the NPS is considering the restoration of these disturbed lands at FLFO through the removal of some of the earthen dams. This removal would have the objective of re-establishing natural hydrologic and geomorphic processes, restoring natural land contours, reclaiming and re-vegetating disturbed areas, and re-establishing wetland structure, function, and hydrology.

Naturally functioning wetlands, floodplains, and riparian areas are one of the most valuable natural resources at FLFO not only due to their intrinsic value but also because of the area’s relatively dry local climate. The existence of the earthen dams and subsequent alteration of natural hydrologic and geomorphic processes has impacted the natural structure and function of wetland ecology and riparian areas that exists in many of the drainages. Many wetland plants and animals are dependent on natural, small-scale disturbances caused by natural hydrologic and geomorphic processes. The earthen dams prevent such natural processes such as overland sheetflow during rain and runoff events. During overland sheetflow, water is spread throughout a drainage, and the energy of the water is dissipated as it flows over more surface area and as the vegetation slows the water down. The earthen dams physically restrict overland sheetflow, and instead pond the water behind the structure and/or funnel the water flow in the spillway or other channel. The restriction and funneling of the water results not in natural wetland ecology and the natural dissipation of the energy of the water, but rather concentrates the energy of the water and causes unnatural hydrologic and geomorphic processes.

The earthen dams and subsequent alteration of natural hydrologic and geomorphic processes contribute to ponding water and unnatural patterns and accelerated levels of erosion. The unnatural concentration of water energy has lead to several headcuts below the earthen dams; the migration of erosional features such as these headcuts toward an earthen dam is of special concern. Several of the earthen dams are of a size and capacity to pond a significant amount of

water behind the structures, and as the structures continue to age and deteriorate, the risk of a breach increases both because of a loss of structural failure and upward migration of headcuts. These conditions have already led to some earthen dam failures at FLFO. Consequently, the probability of additional earthen dam failures increases with time, raising concern regarding failures releasing ponded water in a single flood event in a concentrated spillway or other channel into the drainage area and extensive erosion and subsequent sediment deposition in downstream wetlands.

To achieve the goal relative to disturbed lands restoration, the NPS contracted a study performed in 1997 to inventory and evaluate the forty-four identified earthen dams at FLFO to assess the benefits, impacts, and relative likelihood of successful disturbed lands restoration. The earthen dams were inventoried and evaluated through a decision support model developed to rank each earthen dam for removal based on effects on wetlands, hydrologic alteration, size, vegetation alteration, accessibility to equipment, erosion concerns (past, present, and predicted), use as a wildlife resource and critical habitat concerns, aesthetics, and other potential benefits such as fire suppression water source and flood control. In all scenarios, seven earthen dams (#31, #32, #34, #47, #39, #14, #9) were ranked near the top of the decision support model for removal because they had the fewest benefits, greatest impacts, and greatest likelihood of restoration success; these seven earthen dams are under consideration for removal and disturbed lands restoration.

This environmental assessment (EA) evaluates a range of alternatives that address the future management of these seven earthen dams at FLFO. Discussion includes the affected environment and associative impacts for each alternative as well as the degree to which each alternative may successfully accomplish FLFO's purpose and need as identified in this section.

An EA analyzes the proposal and alternatives and their impacts on the environment. This EA has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended, and with the regulations of the Council of Environmental Quality (CEQ) (40 CFR 1508.9), the agency of the President's office that is the caretaker of NEPA as established by the act. The purpose of NEPA as stated in Section 2 of the act that created it is to "encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; and to enrich the understanding of the ecological systems and natural resources important to the Nation...". A balance between use and preservation of natural and cultural resources was established as a goal for federal decision-making as a result of NEPA. NEPA is the environmental component of NPS planning and, under the regulation of the CEQ, it is integrated with other agency planning as early as possible to insure that planning and decisions reflect environmental values when an agency is considering different means of accomplishing a goal that may have impacts on the human environment. NEPA requires the NPS to prepare in-depth studies of the impacts of and alternatives to proposed actions, to use the information contained in such studies in deciding whether to proceed with the actions, and to attempt to involve the interested and affected public before any decision affecting the environment is made. The guiding provisions of the 1916 OA and the information and analysis produced through the NEPA process jointly commit the NPS to making informed management decisions that perpetuate the conservation and protection of NPS administered park resources.

Hardcopies of this EA have been mailed to public libraries in Colorado Springs, Woodland Park,

and Florissant, Colorado. The electronic version (text and appendix = 4,634KB) is available to download on the NPS website at www.nps.gov/flfo; for ease of transmission, the text and appendix may be downloaded separately (165KB and 4,488KB, respectively). You may also contact Florissant Fossil Beds National Monument at (719) 748-3253 and provide your e-mail address to be sent the electronic version.

In order to be considered in the decision making process, comments must be received within thirty days from the date of this EA. Public comments received on this EA will not be available for public review until after the EA comment period ends; names and addresses of people that comment on this EA will then be available to the public upon request. You can submit your comments to us in several ways:

- By mail: Superintendent, Florissant Fossil Beds National Monument, 15807 Teller County Road #1, P.O. Box 185, Florissant, Colorado, 80816.
- By e-mail: Jean_Rodeck@nps.gov
- By FedEx: Superintendent, Florissant Fossil Beds National Monument, 15807 Teller County Road #1, P.O. Box 185, Florissant, Colorado, 80816.
- Hand deliver: Florissant Fossil Beds National Monument Headquarters, 15807 Teller County Road #1, Florissant, Colorado, 80816.

II. BACKGROUND

Project Background and Scope

The valley in which FLFO is situated was occupied frequently by the Ute Indians but their presence left little impact. It was not until the 1800s that explorers of European descent began to visit the area. Pioneers who came to farm, ranch, and/or search for gold first settled in the area of FLFO in the late 1800s, and the town of Florissant was founded in 1872. Visitors have been coming to the area that is now FLFO for recreational purposes for over 100 years. Land comprising FLFO was homesteaded, farmed, and ranched by these pioneering families and their successors up until the time of the creation of the monument in 1969. The SCS helped install forty-four earthen dams on what is now FLFO during the mid-1900s for erosion control, and water retention and diversion in association with land management and use practices (ranching and farming) at the time.

Since the establishment of the Monument in 1969, land management and use practices are now based on FLFO's mission and NPS policies to restore native communities and natural processes. Each of the forty-four earthen dams identified at FLFO was evaluated based on a variety of quantitative and value-driven variables during the NPS contracted study in 1997. The study identified seven of the earthen dams (#31, #32, #34, #47, #39, #14, #9) as successful candidates for removal and disturbed lands restoration because they have the greatest impacts, fewest benefits, and greatest likelihood of restoration. Though three of the seven earthen dams are currently retaining water behind their structures, the unnaturally ponded and sometimes stagnant water is not considered to be of critical significance as habitat, or a fire suppression source, as other water sources are available nearby. The seven earthen dams do not provide any significant flood control benefits; average precipitation rates at FLFO along with the presence of additional dams upstream on private lands, preclude the concern for routine flooding. In a catastrophic flood event the earthen dams would most likely fail because of their small size and/or lack of structural integrity. The unnatural and visually obtrusive structures also limit visitor enjoyment as they fragment an otherwise pristine-looking montane landscape, although some visitors would lose the visual aspect of the open water habitat associated with the three earthen dams which are currently retaining water. For NPS employees at FLFO as well as FLFO's tight operating budget, time and cost would be exerted in the continuing evaluation and maintenance of the structures. This required effort is expected to only increase annually as the structures continue to age.

The scope of this EA considers possible alternatives that address the future management of the seven earthen dam locations. Each of the seven earthen dams are identified by numbers as designated during the NPS contracted study of 1997. The dams are located along two major drainage corridors at FLFO. Four of the earthen dams (#31, #32, #34, #47) are located in series on an unnamed tributary of Grape Creek in a drainage corridor referred to as "Boulder Creek". The other three earthen dams (#39, #14, #9) are each situated within separate drainage areas on other unnamed tributaries along a larger drainage corridor along Teller County Road #1 that also drains into Grape Creek.

Relationship to Other Planning Projects

The significance of FLFO lies in displaying, preserving, and making available for public use and enjoyment exceptional examples of paleontological features. Minimizing impacts to FLFO resources yet still providing interpretive and recreational opportunities for the public is consistent with FLFO's enabling legislation and mission.

The NPS is committed to carrying out the trust responsibilities related to park resources at FLFO under the provisions of the 1916 OA, the 1969 authorizing legislation, the 1970 GAA, the NPS Management Policies, and the *Strategic Plan* as guided by the 1993 GPRA. The future management of the seven earthen dam locations should be harmonious with the specific long-term goals the NPS will achieve through 2005 in pursuit of the mission of FLFO as outlined in FLFO's *Strategic Plan*. The long-term goals include the commitment to preserve FLFO resources, to provide for the public enjoyment and visitor experience at FLFO, to strengthen and preserve natural and cultural resources and enhance recreational opportunities, and to ensure the organizational effectiveness of FLFO.

Issues and Objectives

The need for action results from the effects of the earthen dams interrupting natural drainage areas. These dams have over time altered the natural hydrologic and geomorphic processes of all major and most minor drainages at FLFO. As a result the existence of the earthen dams runs contrary to the mission of FLFO as they pose an ongoing threat to the natural landscapes, inhibiting natural processes and scenic beauty, and altering the natural occurrence and function of wetlands, floodplains, and riparian areas. The aged structures are also a threat to FLFO natural resources due to the risk posed from inevitable breach and/or failure and resultant flooding, unnatural patterns and accelerated levels of erosion, and sedimentation of downstream wetlands.

To resolve the need for action, the goals/objectives of future management actions are to (1) meet NPS regulations, policies, and guidelines, (2) meet FLFO's mission and management plans, (3) minimize the past, present, and future effects of the seven earthen dams on FLFO resources.

The interdisciplinary team (IDT) approach was used to identify issues or environmental problems that need to be addressed in considering possible alternatives that address the future management of the seven earthen dam locations. In accordance with CEQ regulations, issues affecting this project were defined by the IDT, which was comprised of NPS specialists; personnel from other federal, state, and local agencies; contractors; and the general public (through comments received on a September 2000 draft EA submitted previously for removal of four of the seven proposed earthen structures, at the associated public meeting held on January 24, 2001, and following the June 2, 2001 open letter announcing the scoping process for this EA)

The following issues and concerns were defined by the IDT: paleontological disturbance and/or loss, unnatural erosional patterns, potential dam breach/failure, flooding and siltation of downstream areas, disturbance to and mortality of vegetation, disturbance to wetland communities, compaction and erosion of bare soils in access routes and work areas, placement of

removed earthen dam materials into historic borrow areas and other areas, mortality for the species associated with the ponded areas, displacement of waterfowl and wildlife, and temporary access restriction for visitors to work areas. The proposed action would not require any permits from federal, state, or local agencies. The NPS has obtained approval/acknowledgement from the U.S. Army Corps of Engineers in a letter dated July 24, 2001 that the proposed alternatives would not require an individual permit for activities in the wetland communities (see Appendix).

Issues and concerns identified by the IDT were distilled into relevant impact topics to focus on the affected environment and facilitate the analysis of environmental consequences, thus allowing for a standardized comparison between alternatives based on the most relevant information. Impact topics (environmental consequence topics) are selected on the basis of significant park resources and the potential for beneficial or adverse effects on those resources by each alternative as required by law, regulation, and NPS policies. Impacts, effects, and environmental consequences are synonymous throughout CEQ regulations and this EA.

Impact Topics Selected for Detailed Analysis

The following impact topics are selected for detailed analysis, as future management actions could have effects on these resources. The analysis of impacts on these resources is presented in Section IV.

Floodplains and Wetlands

Executive Order 11988, "Floodplain Management," and Executive Order 11990 "Protection of Wetlands", direct the NPS to avoid, to the extent possible, the long- and short-term adverse impacts associated with modifying or occupying floodplains and wetlands. They also require NPS to avoid direct or indirect support of floodplain or wetland development whenever there is a practical alternative.

Vegetation

NPS policy is to protect the abundance and diversity of the park's naturally occurring plant communities. Executive Order 13112 and the Federal Noxious Weed Control Act direct the NPS to engage in management that will not contribute to the introduction, continued existence, or spread of non-native invasive species and federally listed noxious weeds or engage in actions that may promote the introduction, growth or expansion of the range of non-native invasive species or federally listed noxious weeds.

Soils and Topography

NPS policy is to protect the park's naturally occurring features and soil quality.

Wildlife

NPS policy is to protect the abundance and diversity of the park's naturally occurring wildlife

communities.

Visitor Experience

Providing for visitor enjoyment is one of the fundamental purposes of the National Park Service.

Impact Topics Dismissed from Detailed Analysis

Other Natural Resources

Section 7 of the Endangered Species Act requires that a federal agency consult with the U.S. Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service on any action that may affect federally listed endangered or threatened species or candidate species, or that may result in adverse modification of designated critical habitat for these species. NPS policy requires examination of the impacts of the project on listed threatened, endangered, or rare species and species of concern. Through consultations with the USFWS, the IDT determined that there are no listed threatened, endangered, or rare species, species of concern, or designated critical habitat within the areas of work for the proposed action [telephone correspondence, USFWS Biologist Pete Plage (7-16-01)].

NPS policy requires examination of the impacts on the following other natural resources: natural soundscapes; refuge lands and wilderness areas; Wild and Scenic rivers; unique natural resources; national natural landmarks; water resources, including sole or principal drinking water aquifers; ecologically significant or critical areas; rare or unusual vegetation (old growth timber, riparian, alpine, etc.); unique ecosystems, biosphere reserves, and World Heritage Sites; unique or important wildlife and wildlife habitat; unique or important fish and fish habitat; energy resources including natural or depletable resource requirements and conservation potential. NPS specialists have concluded that these resources will not be affected by future management actions.

The Clean Air Act requires federal land managers to protect park air quality. NPS policies call for air resource management to be integrated into NPS operations and planning and for all air pollution sources within parks to comply with all federal, state, and local air quality regulations. Future management actions would not have a long-term impact on air quality.

In August 1980, the Council on Environmental Quality (CEQ) directed that federal agencies must assess the effects of their actions on farmland soils classified as prime or unique. According to the NRCS, none of the soils that could be affected by future management actions are classified as prime or unique (NRCS memorandum dated July 17, 2001 on file with NPS).

According to FLFO's staff paleontologist, Dr. Herbert W. Meyer, no paleontological resources would be affected by the alternatives examined in this EA.

Cultural Resources

The National Historic Preservation Act (NHPA), NEPA, NPS Management Policies, NPS-2

(Planning Process), and NPS-28 (Cultural Resource Management) call for the consideration of historic and archeological resources in planning proposals. Section 106 of the NHPA requires federal agencies to consider the effects of their proposals on historic properties and to provide (as applicable) state historic preservation officers, tribal historic preservation officers, and as necessary, the Advisory Council on Historic Preservation a reasonable opportunity to review and comment on the proposed action. Secretarial Order 3175 and ECM95-2 and Executive Order 13007 call for the consideration of environmental impacts of proposed actions on Indian Trust Resources and Sacred Sites.

The areas in which the seven dams proposed for removal are located were surveyed for archeological resources in 1974 (Olson and Rowland, 1974); no historic materials or properties were found. The dams themselves were evaluated in 1993 by NPS Rocky Mountain Region Chief of Cultural Resources Rodd Wheaton (Wheaton, 1993); Mr. Wheaton concluded that they held no particular significance.

In accordance with Section 106 of the NHPA, the State Historic Preservation Office (SHPO) was consulted by the IDT with respect to possible management actions. In a memorandum signed July 19, 2001 the SHPO concurred with the NPS finding that no historic properties would be affected (see Appendix).

Socioeconomic Environment

NPS policy requires examination of the impacts on the following socioeconomic resources: recreation resources (including supply, demand, visitation, activities, etc.); socioeconomics (including employment, occupation, income changes, tax base, infrastructure); minority and low-income populations (ethnography, size, and migration patterns); and public health and/or safety. Additionally, Executive Order 12898, "General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," directs federal agencies to assess whether their actions have disproportionately high and adverse human health or environmental effects on minorities and low-income populations and communities, and to analyze and evaluate the equity of distribution of the benefits and risk of the decision in the EA.

The small local economy is based on professional services, agriculture, construction, tourism, and light industry. The communities surrounding the park are sparsely populated and concentrated near the town of Florissant, located approximately one mile north of the areas affected by the proposed action. NPS specialists concluded that the socioeconomic environment (including minorities or low-income populations or communities) is not anticipated to be impacted by future management actions.

III. ALTERNATIVES

As required by NEPA, a range of alternatives was considered in this EA, including reasonable alternatives, unreasonable alternatives, and alternatives considered but rejected. The alternatives were developed by the IDT with environmental resources as the primary determinant. Other factors included in the development of alternatives were agency and environmental constraints, policies in NPS planning documents and legislation, and site characteristics.

The options carried forward as reasonable alternatives for analysis were developed as having the greatest potential to meet goals and objectives and resolve the need for action (as outlined in the previous section) to a large degree, although not necessarily completely, while at the same time protecting or minimizing impacts to some or all resources. This EA describes three alternatives carried forward for analysis that, in accordance with CEQ regulations, cover the full spectrum of alternatives: Alternative 1 (*No Action*), Alternative 2 (*Maintenance*), Alternative 3 (*Restoration of Disturbed Lands by Removal of Seven Earthen Dams*).

The NPS's preferred alternative is Alternative 3 - *Restoration of Disturbed Lands by Removal of Seven Earthen Dams*. The NPS believes Alternative 3 would best fulfill its statutory mission and responsibilities, giving consideration to economic, environmental, technical, and other factors and also meet the need as outlined in the Purpose and Need section of this document. The agency's preferred alternative was identified by Jean H. Rodeck, Superintendent at FLFO.

All relevant and reasonable mitigation measures that could improve the action and reduce or eliminate adverse environmental consequences were integrated into the alternatives where it was feasible to do so. Mitigation measures discussed cover the range of impacts of the alternative, even for impacts that by themselves would not be considered "significant". Mitigation measures are integral to each alternative proposed for the future management of the seven earthen dams yet are dependent on factors such as funding. As such, the probability of the mitigation measures being implemented is also discussed.

Table 1 (page 15) presents a summary of the alternatives considered in this EA.

Alternative 1 - No Action

The no action alternative may be thought of as continuing with the present course of action. It does not imply or direct performing maintenance or removing the seven earthen dams or restoring any disturbed lands. No action is the continuation of existing conditions and activities without a particular planning context.

The no action alternative is presented first as it sets a baseline of existing impact continued into the future against which to compare impacts of action alternatives.

Mitigation Measures

Should the no action alternative be selected, NPS would respond to future needs and conditions associated with the seven earthen dams without major actions or changes and with the present nominal to non-existent management operations.

Alternative 2 – Maintenance

Alternative 2 is the retention of all seven earthen dams and implementation of maintenance activities that would be required to prevent their being breached by headcuts, overtopped, or failing in some other fashion. The dams exhibit various stages of disrepair and have exceeded their expected life spans without maintenance; as such, if these structures were to be retained, they would need to be upgraded to make them compliant with modern engineering design standards for impoundments. The dams are composed of loose sand and gravel and are sloughing and leaky; the dams would need to be reconfigured for stability and sealed so they can actually impound water. The dams would need appropriate principal and emergency spillways that would be constructed to safely control the design storm event and maintain water at an intended elevation for a given duration.

Short-term maintenance activity would include activities toward upgrading/reconfiguring the dams into functioning structures that meet modern engineering design standards. Long-term maintenance activities would consist of importation of soil to replace that lost to erosion and re-vegetation of bare areas. These short- and long-term maintenance activities would be applied to Dams #31, #32, #39, #9, and #14; Dam #47 and Dam #34 would be inspected periodically but do not require any action to prevent their being breached as they are relatively small and do not obstruct the entire drainage or impound water.

In order to complete the short-term maintenance activities, an architectural/engineering (A/E) design firm would develop design plans to upgrade/reconfigure the dams to current standards. The A/E firm would survey and collect geotechnical information at each dam in order to assess the existing conditions at each structure and to complete a design storm hydrologic analysis. With this information, the A/E firm would then develop detailed design plans for each structure. Once the design plans are completed, construction tasks would begin to upgrade/reconfigure the dams to current standards. Treatment at dams #9, #14, #31, and #32 would be accomplished by first pumping the water out of the impoundments and around the structure as needed to eliminate standing water and to provide for safe site conditions during construction activities. Treatment at dams #47, #34, and #39 is not anticipated to require any pumping of surface water. Construction activities to reconfigure and seal the embankment, to (re)construct a principal spillway, and to reconfigure an emergency spillway with riprap would then be completed per the detailed design plans.

Alternative 2 would require annual expenditures from FLFO's operating budget and a commitment of FLFO staff time to plan, implement, and monitor. Alternative 2 would require an initial estimated expenditure of \$106,000 to complete the short term maintenance activities toward upgrading/reconfiguring the earthen dams into functioning structures that meet current engineering design practice standards. As the frequency with which the long term maintenance activities would be necessary would vary from dam to dam and would also be dependent on the

frequency and intensity of storm events in the dammed drainage basins, it is not possible to provide an estimate of expenditures for those activities. However, the magnitude of long term maintenance expenditures would be expected to increase with time as the earthen dams continue to age.

Mitigation Measures

Work areas would be closed to FLFO visitors. However, the lack of visitor access to these areas would be mitigated by the educational value of the restoration activities; interpretive signs would be placed at the boundaries of the closure areas and in the visitors center.

Disturbance to vegetation would be minimized by accessing the dams using existing FLFO trails. Access to structures #31, #32, #47, #39, and #34 would require passage on existing FLFO roads and trails. Access to dams #9 and #14 would require passage across relatively undisturbed land.

Access routes are mapped on Figure 2. The contractor would minimize travel on the access routes and would be required to minimize disturbance to the access routes by brushing, disturbing, or removing vegetation only where necessary for equipment passage. Repeated access would be needed in the inspection and maintenance phase, and would be a continuing impact, especially on those dams not adjacent to roads or trails. Generation of dust from construction activities would be minimized through the use of a dust palliative. Disturbed areas would be hand raked to eliminate heavy equipment tracks and scars. Re-vegetation of access routes would also occur so as to blend in with native vegetation.

Vegetation impacts and potential impacts to soils (e.g. compaction and erosion) would be minimized by stockpiling topsoil; returning topsoil to locations as near to its original location as possible; and where appropriate scarifying, mulching, and seeding and/or planting with species native to the immediate area. Ecotypes adapted to environmental conditions similar to FLFO would be used where available. Compaction would be mitigated by mechanical means (e.g., disking, ripping, etc) when necessary. Re-vegetation efforts would strive to reconstruct the natural spacing, abundance, and diversity of native plant species. In an effort to avoid introduction of exotic plant species, no imported topsoil, hay bales, irrigation or fertilizer would be used, and construction equipment would be decontaminated prior to being used at FLFO.

Upland topsoil would be salvaged where possible to hasten rehabilitation of soil structure when it is not contaminated with weedy species. Salvaged topsoil would be stored for as little time as possible, and in as shallow a pile as possible. Seedbeds would be prepared in such a way that the soil would be loose enough for seeds to sprout and penetrate the soil, and yet firm enough to prevent the soil from washing or blowing away. Highly compacted subsoil would be scarified to a depth of 6 to 12 inches before covering with topsoil to allow for root penetration as vegetation develops. Minimum topsoil depth would be four-to-six inches. After broadcasting seeds, the area would be immediately hand raked to loosely cover the seeds. In addition to seeding, any salvaged native plants would be restored when feasible to increase the rate of successful vegetation establishment and to provide a more diverse and natural looking landscape by providing mature seed plants.

If appropriate, salvage and storage of wetland topsoil would be similar to that of upland topsoil.

Any soil removed from areas currently under the impoundment areas of the dams would be salvaged and used as a wetland topsoil layer for any required reclamation of the wetland/wet-meadow complex to take advantage of the soil's rich and diverse seed bank of native wetland species. Seeding of wetland reclamation sites should not be necessary. However, wetland areas to be transplanted may be deconsolidated by disking, ripping, plowing, or tilling as necessary to encourage plant establishment. If necessary, the wetland community growing in the ditch associated with Dam#32 would be carefully removed, including the topsoil down to about 6 to 18 inches, and stored for later use as transplant material in the reclaimed wetland area(s).

The estimated costs for the implementation of the mitigation measures are included in the overall cost estimate for this alternative; therefore, all necessary/appropriate mitigation measures would be implemented should the alternative be selected.

Alternative 3 – Restoration of Disturbed Lands by Removal of Seven Earthen Dams

The NPS preferred alternative for management of the dams is the restoration of the disturbed lands associated with the seven dams ranked highest in priority by the evaluation. The proposed action is to remove the dams, restore the natural contours and hydrologic and geomorphic processes in the channels, and re-vegetate the associated upland and wetland areas. Seven earthen dams (#9, #14, #31, #32, #47, #34, and #39) would be removed, requiring the re-distribution of approximately 16,155 cubic yards of material.

Treatment at dams #9, #14, #31, and #32 would be accomplished by first pumping the water out of the impoundments as needed to eliminate standing water and to provide for safe site conditions during embankment removal. NPS personnel would stake the upstream disturbance limits after these impoundments have been drained. Before dam removal activities commence, silt fence would be placed within five feet of the downstream toe of the dam across the entire width of the drainage bottom. The contractor would remove and direct-haul the embankment and other fill materials for dam #9, #14, #31, and #32 (approximately 10,095, 2,610, 1,680, and 1,010 cubic yards, respectively). The materials would be placed according to NPS plans into the upland areas they were originally borrowed from to blend in with the adjacent slopes and surrounding topography. NPS personnel would indicate the cut and fill areas in the field and any unforeseen excess material would be placed where designated by NPS personnel to blend inconspicuously into adjacent upland areas. The borders of any areas having unforeseen material deficits would be graded to blend inconspicuously into adjacent upland areas.

Treatment at dams #47, #34, and #39 would proceed in a similar manner to the treatment at the other four dams as detailed above, except that no pumping of surface water is anticipated. Anticipated removal volumes of embankment and other fill materials for dams #47, #34, and #39 are approximately 59, 46, and 655 cubic yards, respectively.

Alternative 3 would require an expenditure from FLFO's operating budget and a commitment of FLFO staff time to plan, implement, and monitor. NPS estimates an expenditure of approximately \$152,000 to complete the activities outlined in this alternative.

Mitigation Measures

Mitigation measures for the activities proposed in this alternative would be the same as previously described under Alternative 2. The estimated costs for the implementation of the mitigation measures are included in the overall cost estimate for this alternative; therefore, all necessary/appropriate mitigation measures would be implemented should the alternative be selected.

Alternatives Considered but Dismissed

The following options were considered: intentionally breaching the earthen dams and allowing for the stream flows to erode the remaining structures over time; shaving down the tops of the earthen dams to allow for the streams to flow over the tops and erode the remaining structure over time; installing culverts through the earthen dam structures to enable continual stream flow and prevent ponding; stocking the ponded areas with fish and placing interpretive signs toward improving visitor enjoyment and experience in these areas; grading the entire drainage topography including the earthen dams to restore an acceptable gradient in the drainages and allow for natural plant community succession to take place over time; and using explosives to remove dams and allowing stream flows to erode the remaining structures over time.

These options were not carried forward for analysis and were dismissed as alternatives because they would not adequately meet FLFO goals and objectives. They would not restore natural hydrology and wetland function or would likely lead to significant erosion and downstream sediment deposition or both. Sediment transport, in particular, would likely result in adverse impacts to downstream wetland communities. Additional reasons for rejecting these management options included: technical, economic, and/or logistical unfeasibility; conflicts with FLFO plans, management objectives, and policies; inappropriate use of land and water resources; and excessive environmental impacts.

Environmentally Preferred Alternative

The environmentally preferred alternative is Alternative 3. This alternative best promotes the national environmental policy expressed in NEPA; results in the least damage to the biological and physical environment; and best protects, preserves, and enhances natural and cultural resources.

Table 1. Alternatives Matrix Summary

	Alternative 1 - No Action	Alternative 2 – Maintenance	Alternative 3 – Restoration of Disturbed Land by Removal of Seven Earthen Dams
Important features	No actions would be taken to maintain or remove the dams.	Maintenance of the dams. Activities to upgrade/reconfigure the dams to modern engineering design standards, and importation of soil to replace that lost to erosion. This alternative would not prevent dam failure in the event of floods of a magnitude exceeding the design of the dams.	Removal of the dams and re-vegetation of the affected upland and wetland areas.
Impacts	(see Table 2. Impact Matrix Summary)	(see Table 2. Impact Matrix Summary)	(see Table 2. Impact Matrix Summary)
Degree to which meets purpose, need, and objectives	Would not re-establish natural hydrologic and geomorphic processes; restore natural land contours; reclaim and re-vegetate disturbed areas; or re-establish wetland structure, function, and hydrology.	Would not re-establish natural hydrologic and geomorphic processes; restore natural land contours; reclaim and re-vegetate disturbed areas; or re-establish wetland structure, function, and hydrology.	Would satisfy all aspects of the project purpose, need, and objectives.
Degree to which achieves Sections 101 and 102(1) of NEPA	Creates some conflict with NEPA Section 101 by creating a risk of environmental degradation when the dams fail.	Creates some conflict with NEPA Section 101 by creating a risk of environmental degradation if the dams fail.	Fully consistent with NEPA Sections 101 and 102(1).
Potential conflicts with other environmental laws and policies	No identified conflicts.	No identified conflicts.	No identified conflicts.

IV. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section presents the environmental consequences (impacts and effects) of the three alternatives on the affected environment. Included are direct, indirect, and cumulative effects.

Table 2 (page 25) presents a summary of the environmental consequences associated with the three alternatives on the affected environment.

Floodplains and Wetlands

Affected Environment

With elevations ranging from 8,180 to 8,960 feet, FLFO lies in the montane life zone in the Southern Rocky Mountains. Temperatures range from a minimum of -35 F in winter to a maximum of 85 F in summer. FLFO is relatively dry and receives only twelve to sixteen inches of rain annually, half of which comes from spotty thunderstorms in July and August. FLFO receives approximately 70 inches of snow annually, most of which falls in February, March and April, though it is unusual for more than a foot of snow to remain on the ground for more than a few days.

NPS regularly monitors surface water quality at four locations on FLFO. Data obtained through that monitoring program indicate that water quality conforms to applicable Federal and State standards.

There are numerous dry gulches and a number of intermittent spring-fed streams scattered throughout FLFO. Several of these intermittent spring-fed streams converge to form Grape Creek, FLFO's only perennial stream. Naturally functioning wetlands, floodplains, and riparian areas are an uncommon feature of FLFO's landscape because of the dry climate and the presence of a number of earthen dams in most drainages.

Impacts of Alternative 1 – No Action

Without intervention by FLFO, the seven earthen dams would continue to deteriorate as a result of natural erosional processes. Dams that currently impound water can be expected to fail, and the earthen berms would erode away. Both circumstances would result in scouring of downstream channels and deposition of large quantities of sediment with attendant adverse short-term and long-term impacts on wetlands, riparian communities, and aquatic life.

Deposited sediment would damage or destroy existing wetland and riparian vegetation and provide a fertile seedbed for non-native vegetation. Suspended sediment would degrade water quality for some distance downstream. Sediment deposits would locally alter stream hydrology and would likely be remobilized by storm events subsequent to their deposition.

Repeated stages of erosion, downstream transport, and redeposition would allow the adverse effects of this alternative to be propagated farther downstream to include stream reaches downstream from the FLFO boundary.

Impacts of Alternative 2 – Maintenance

The maintenance activities associated with Alternative 2 would be undertaken for the express purpose of avoiding the adverse impacts of Alternative 1. Through continued dam maintenance, breaching of dams and erosion of berms can be minimized, although not necessarily precluded in the event of flood events that exceed design specifications.

The construction activities required for implementation of Alternative 2 would be accompanied by some short-term adverse impacts to floodplains and wetlands. These impacts would primarily result from the disturbance of soils and sediments by construction equipment. While largely controlled by the planned use of erosion mitigation measures, such as silt fences adjacent to water bodies, there could be some temporary increases in suspended sediments in the streams during intermittent periods of flow.

The continued existence of the earthen dams would perpetuate existing environmental conditions in the affected drainages. Modified hydrologic regimes would continue to influence the nature of wetland and riparian communities and would extend for some distance downstream from the dams. Unless replaced with additional funding, the resources required for the implementation of Alternative 2 would reduce the operating budgets available for other programs at FLFO.

Impacts of Alternative 3 – Restoration of Disturbed Land by Removal of Seven Earthen Dams

Alternative 3 would remove the dams having the greatest impacts, fewest benefits, and greatest likelihood of successful restoration. This alternative would re-establish natural hydrologic and ecological processes, and reduce the likelihood of large-scale erosion and sediment transport associated with Alternative 1 and, to a lesser degree, Alternative 2.

The construction activities required for implementation of Alternative 3 would be accompanied by some short-term adverse impacts to floodplains and wetlands. These impacts would primarily result from the disturbance of soils and sediments by construction equipment. While largely controlled by the planned use of erosion mitigation measures, such as silt fences adjacent to water bodies, there could be some temporary increases in suspended sediments in the streams during intermittent periods of flow.

Long-term impacts would result from replacement of the existing hydrologic regime with a new, more natural hydrologic regime. Wetland plants adjacent to currently impounded water would be lost and replaced with upland plant communities. New wetland and riparian communities would be established through re-vegetation and through natural processes in locations determined by the modified stream channel geometry and hydrologic patterns. These impacts, however, are consistent with the purpose and need of the project and are generally beneficial in nature.

High intensity storms over the initial years following completion of project activities could result in some degree of failure of restoration efforts by removing recently restored soils/vegetation or newly established wetland and riparian communities, eroding/scouring the channel, and depositing sediment downstream. Vulnerability with respect to this possible impact would decrease with time following completion of project activities.

Conclusions

Implementation of Alternative 1 would likely lead to failure of the existing dams and erosion of the berms, accompanied by scouring of downstream channels and sediment deposition in downstream floodplains and wetland plant communities. Large-scale adverse impacts to downstream wetland and riparian communities would result.

Alternative 2 would minimize the extent to which the dams fail through erosion and overflow but would likely be accompanied by short-term adverse impacts on downstream water quality during intermittent stream flows. The possibility would remain, however, that a flood event exceeding the designed capability of the dams could produce the same results and adverse impacts associated with Alternative 1. Additionally, the maintenance costs associated with Alternative 2 would reduce the funds available for other programs at FLFO.

Alternative 3 would eliminate the concern over dam failure but would likely be accompanied by short-term adverse impacts on downstream water quality during intermittent stream flows. Alternative 3 would modify unnatural stream channel geometry and hydrologic patterns, re-establish natural hydrologic and ecological processes, and reduce the likelihood of large-scale adverse impacts associated with Alternative 1 and, to a lesser degree, Alternative 2.

Vegetation

Affected Environment

The FLFO upland landscape is dominated by mountain meadows and interspersed forests of ponderosa pine (*Pinus ponderosa*). Upland vegetation in the project area is comprised of low shrubs, grasses, and annual or perennial herbs. Many of the native low shrub species are composites (Asteraceae), characteristic of desert-steppe ecosystems. Some of these are the rabbitbrushes (*Chrysothamnus viscidiflorus*, and *C. parryi*), gumweed (*Grindelia subalpina*), snakeweed (*Gutierrezia sarothrae*), silver sage (*Artemisia frigida*), prairie sage (*A. ludoviciana*), horsebrush (*Tetradymia canescens*) and the Colorado rubber plant (*Picradenia richardsonii*).

Some of the most common native grasses are Arizona fescue (*Festuca arizonica*), mountain muhly (*Muhlenbergia montana*), blue grama (*Bouteloua gracilis*), needle-and-thread (*Stipa comata*), sleepygrass (*S. robusta*), pine dropseed (*Blepharoneuron tricholepis*), nodding brome (*Bromopsis porteri*), squirreltail (*Elymus longifolius*), and oatgrass (*Danthonia parryi*). Depending on the season, some of the more common native herbs are, golden aster (*Heterotheca fulcrata*), ragwort (*Packera tridenticulata*), miner's candle (*Oreocarya virgata*), wallflower (*Erysimum capitatum*), mariposa (*Calochortus gunnisonii*), paintbrush (*Castilleja integra*), owl-

clover (*Orthocarpus luteus*), penstemon (*Penstemon virgatus* ssp. *asagrayi*), flax (*Adenolinum lewisii*), daisy (*Erigeron vetensis*) and ground plum (*Astragalus crassicaupus*).

Wetland areas are vegetated with open wet meadows dominated by rushes and sedges. Wetland plants include grasses such as reedgrass (*Calamagrostis canadensis*), and bluegrasses (*Poa* spp.), rushes such as wiregrass (*Juncus arcticus*), and sedges such as *Carex aquatilis* and *Carex nebrascensis*. The most abundant forb is silverweed (*Argentina anserina*), and the dominant shrub is shrubby fivefinger (*Pentaphyloides floribunda*).

Past agricultural practices and other land disturbances have allowed noxious weeds to spread into native plant communities. There are no threatened or endangered plant species within the project area.

Impacts of Alternative 1 – No Action

Implementation of Alternative 1 would entail both short-term and long-term impacts. The existing plant communities in the project area that were created by construction of the earthen dams (primarily the creation of wetland communities where upland communities would ordinarily be found) would be continued as long as the structures are intact. Downstream wetland and riparian communities would continue to receive sediment eroded from the edges of the dams.

When the dams eventually fail, large quantities of sediment would be transported downstream and deposited in low-lying areas. The existing stream channel would likely be scoured and widened, removing vegetation adjacent to the stream. Existing plants in those areas would be largely replaced by early successional species that might include a significant number of noxious weeds. This pioneer plant community would eventually be replaced by plants adapted to the new hydrologic regime.

Impacts of Alternative 2 – Maintenance

Implementation of Alternative 2, like Alternative 1, would continue the existence of the altered plant communities adjacent to the earthen dams. Furthermore, flood events exceeding in magnitude the designed capability of the dams would pose the possibility of breaching the dams. Should that happen, the impacts of this alternative on vegetation would be the same as those associated with Alternative 1.

Impacts of Alternative 3 – Restoration of Disturbed Land by Removal of Seven Earthen Dams

Removal of the seven dams would temporarily eliminate some vegetation over an area of about fifteen acres. Approximately ten ponderosa pines would be removed for equipment access. Disturbance to vegetation would be minimized by restricting access as much as possible to previously disturbed areas. There would be some mortality resulting for the existing plant communities in the project areas; these disturbed areas would be re-vegetated with native species so as to restore the natural spacing, abundance, and diversity of native plant species,

though high intensity storms over the initial years following completion of project activities could result in some degree of failure of restoration efforts. In an effort to avoid introduction of exotic plant species, no imported topsoil or hay bales would be used, and equipment would be decontaminated prior to being used on FLFO.

Conclusions

Alternative 1 would allow the existing altered plant communities to remain in place until the dams eventually fail. Dam failure would result in scouring of plants adjacent to the stream channel, burial of plants in areas of deposition, replacement of existing plant communities with early succession communities, and the introduction of noxious weeds in affected areas.

Alternative 2 would also continue the existence of altered plant communities adjacent to the dams. Floods exceeding the design criteria for this alternative could breach the dams and result in the same impacts to vegetation that would be associated with Alternative 1.

Alternative 3 would temporarily eliminate some vegetation in construction areas. The planned re-vegetation of these areas with native plants and the measures that would be taken to avoid introduction of noxious weeds would allow the project area to be restored with vegetation characteristic of the area prior to construction of the dams.

Soils and Topography

Affected Environment

The soils at FLFO are derived from decomposed basement rock (Pikes Peak Granite and the mudflow tuff layer of the Florissant Formation) and alluvial materials. The soils have poor cohesive qualities and erode easily once the surface vegetation is disturbed. Some areas on FLFO have experienced unnatural patterns and accelerated levels of erosion in areas where past land use practices exposed soils.

Soils in the project area consist of the Fourmile-Lymanson-Vaben complex on the uplands and Nevada-Vaben complex in the drainage bottoms.

Impacts of Alternative 1 – No Action

The dams currently alter natural processes of erosion and sediment deposition by creating low-velocity environments for stormwater that allow sediments that would otherwise be transported downstream to be deposited behind the dams. As a result, portions of the stream basins have been covered with sediments. In other cases, head cutting at the base of the dams has contributed to downstream sedimentation. Implementation of Alternative 1 would allow these imposed processes to continue to operate until the dams fail. When dam failure occurs, large quantities of sediment would be transported downstream and deposited in low-lying areas. In addition, the existing stream channel would likely be scoured and widened. The result would be an alteration of stream channel geometry and a redistribution of sedimentary materials in the basin.

Impacts of Alternative 2 – Maintenance

Implementation of Alternative 2 would allow sediment deposition behind the dams and erosion at the downstream toe of the dams to continue. Should a flood event with intensity greater than the design flood occur, the dams could fail, allowing the impacts associated with Alternative 1 to occur.

Impacts of Alternative 3 – Restoration of Disturbed Land by Removal of Seven Earthen Dams

Construction activities associated with Alternative 3 would temporarily compact soils over approximately one half acres. However, this process would be mitigated by mechanical means (e.g., disking, ripping, etc) when necessary. Some topsoil structure would be destroyed during salvage operations. Rehabilitation of the soil structure in the construction area, however, would be hastened by use of salvaged topsoil, though high intensity storms over the initial years following completion of project activities could result in some degree of failure of restoration efforts.

Conclusions

Alternative 1 would allow altered patterns of erosion and sediment deposition to continue in the project area. Eventual failure of the dams would result in altered stream channel geometry and a redistribution of sedimentary materials over large downstream areas.

Alternative 2 would also allow existing altered patterns of erosion and sediment deposition to continue. Floods exceeding the design criteria for this alternative could breach the dams and result in the same impacts to soils and stream channel geometry that would be associated with Alternative 1.

Alternative 3 would temporarily compact some soils in the construction areas and destroy the soils structure in other areas. These impacts would be mitigated by disking or ripping compacted soils and by application of salvaged topsoil.

Wildlife

Affected Environment

FLFO provides habitat for many wildlife species, including at least 25 mammals, 105 birds, 2 amphibians, 2 reptiles, and over 250 insects. Common mammals include mule deer, elk, black bears, coyotes, porcupines, badgers, weasels, chipmunks, ground squirrels, Albert's squirrels, cottontail rabbits, bats, and mice. There are no threatened or endangered wildlife species found within the project area. The dams currently provide wetland and aquatic habitat not typical of the drainages in which they are located. This artificial habitat supports species such as muskrat, chorus frogs, red-winged blackbirds, and waterfowl.

Impacts of Alternative 1 – No Action

Alternative 1 would continue to provide artificial habitat for aquatic and wetland species in the drainages in which the dams are located until the dams eventually fail. When dam failure occurs, the existing habitats associated with the dams would be lost, and major changes would occur in downstream habitats. Wildlife using these habitats would be affected accordingly. Streamside vegetation would be temporarily lost; late successional plant communities would be replaced with early successional communities; and noxious weeds would be given an opportunity to spread.

Impacts of Alternative 2 – Maintenance

Construction activities for Alternative 2 would temporarily displace some species and insects and small rodents might suffer some mortality. This alternative would continue to provide artificial habitat for aquatic and wetland species in the drainages in which the dams are located. Floods exceeding the design criteria for this alternative could breach the dams and result in the same impacts to wildlife that are associated with Alternative 1.

Impacts of Alternative 3 – Restoration of Disturbed Land by Removal of Seven Earthen Dams

Construction activities would temporarily displace some species. Insects and small rodents might suffer some mortality. Alternative 3 would alter available habitat in the project area for some species. The dams currently provide wetland and aquatic habitat that would be replaced with habitat typical of other intermittent stream drainages in the area. Wildlife dependent on the existing wetland and aquatic habitats created by the dams would be replaced with species associated with intermittent stream drainages, though high intensity storms over the initial years following completion of project activities could result in some degree of failure of restoration efforts of some vegetation (habitat).

Conclusions

Alternative 1 would allow artificial wetland and aquatic wildlife habitats to continue to exist in the project area. Eventual failure of the dams would result in loss of the artificial habitats and significant alteration of downstream habitats.

Alternative 2 would cause the temporary displacement of some species during construction and the possible loss of some insects and rodents. This alternative would also allow existing artificial habitats to continue to exist. Floods exceeding the design criteria for this alternative could breach the dams and result in the same impacts to wildlife habitats that would be associated with Alternative 1.

Alternative 3 would cause the temporary displacement of some species during construction and the possible loss of some insects and rodents. Artificial habitats would be replaced with habitat typical of other intermittent stream drainages in the area.

Visitor Experience

Affected Environment

In the year 2000, FLFO hosted 82,094 visitors, 57 percent of which visited during the period June through August. The number of visitors during spring and fall months was approximately one-third of the number visiting during summer months. Less than 10 percent of the visits occurred during the winter period of November through February.

The average visitor length of stay at FLFO is 1.2 hours, and the primary visitor activity is touring the visitor center and the portion of the project area associated with the petrified Sequoia stumps.

There are fifteen miles of gravel hiking trails, including two miles of self-guided trails. Approximately 10 percent of the visitors view or walk the Boulder Creek Trail that travels past dams #47, #32, and #31 and nearby dam #34. The road to the Fowler Environmental Education Center that travels past dam #39 is used by about 2,000 visitors annually. Dam #9 is highly visible from the intersection of Teller County Road 1 and Lower Twin Rock Road and can be seen by approximately 30 percent of Monument visitors as well as daily by many non-recreational commuters through the Monument.

Impacts of Alternative 1 – No Action

Under Alternative 1, visitor enjoyment would continue to be limited by the visual intrusion of most of the dams because they fragment an otherwise pristine-looking landscape. The pond behind dam #31 is visually pleasing and would continue to be enjoyed by visitors.

When the dams eventually fail, visitor access to and enjoyment of the dams and areas downstream from the dams would be greatly reduced for some period of time because of washed out trails, stream channel scouring, loss of streamside vegetation, the presence of mud flats in areas of deposition, and exposed pond bottoms.

Impacts of Alternative 2 – Maintenance

Alternative 2 would continue to limit visitor enjoyment by the visual intrusion of the dams, though some visitors undoubtedly enjoy the ponded water behind dam #31. Floods exceeding the design criteria for this alternative could breach the dams and result in the same adverse impacts to visitor enjoyment that are associated with Alternative 1.

Impacts of Alternative 3 – Restoration of Disturbed Land by Removal of Seven Earthen Dams

The project area would be closed to visitors during construction and restoration. However, the lack of visitor access to these areas would be mitigated by the educational value of the restoration activities. Interpretive signs would be placed at the boundaries of the closure areas and in the visitors center. Following site restoration, the affected drainages would regain their once-pristine appearance, though high intensity storms over the initial years following completion of project activities could result in some degree of failure of restoration efforts.

Access to and enjoyment of other portions of FLFO would be unaffected.

Conclusions

Alternative 1 would retain the dams, which are generally an intrusion on the visual landscape. It would also retain the pleasing pond behind Dam #31. Failure of the dams would greatly diminish the aesthetic value of downstream areas and would limit visitor access to those areas.

Alternative 2 would retain both the negative and positive impacts of the dams on visitor experience that currently exist. Floods exceeding the design criteria for this alternative could breach the dams and result in the same adverse impacts on visitor experience that would be associated with Alternative 1.

Alternative 3 would create temporary local adverse impacts to visitor enjoyment because of the construction activities and limitations on access to those areas. These adverse impacts would be mitigated by the educational value of interpretive signs and exhibits and the restored appearance of the former dam areas.

Table 2. Impact Matrix Summary

	Alternative 1 - No Action	Alternative 2 – Maintenance	Alternative 3 – Restoration of Disturbed Land by Removal of Seven Earthen Dams
Floodplains and Wetlands	The dams would continue to deteriorate and eventually fail. Depending on the timing and nature of the failure, significant erosion, sediment transport, and loss of wetland habitat would result.	Existing constraints on hydrology, erosional and depositional processes, and wetland functions would be retained. High intensity storms could cause failure of dams.	Reclamation would re-establish natural hydrology, erosional and depositional processes, and wetland functions to a highly altered landscape.
Vegetation	The dams would continue to deteriorate and eventually fail, resulting in scouring of plants adjacent to the stream channel, burial of plants in areas of deposition, replacement of existing plant communities with early succession communities, and the introduction of noxious weeds in affected areas.	Altered plant communities adjacent to the dams would persist. Floods exceeding the design criteria for this alternative could breach the dams and result in the same impacts to vegetation that would be associated with Alternative 1.	Some vegetation in construction areas would be temporarily eliminated. The planned re-vegetation of these areas with native plants and the measures that would be taken to avoid introduction of noxious weeds would allow the project area to be restored with vegetation characteristic of the area prior to construction of the dams. High intensity storms over the initial years following completion of project activities could result in some degree of failure of restoration efforts.
Soils	With no action, the dams continue to deteriorate, and would eventually fail, causing altered stream channel geometry and a redistribution of sedimentary materials over large downstream areas.	Existing altered patterns of erosion and sediment deposition would continue. Floods exceeding the design criteria for this alternative could breach the dams and result in the same impacts to soils and stream channel geometry that would be associated with Alternative 1.	Some soils in the construction areas would be temporarily compacted and the soils structure would be destroyed in other areas. These impacts would be mitigated by disking or ripping compacted soils and by application of salvaged topsoil
Wildlife	The dams would continue to deteriorate and eventually fail, causing loss of existing atypical wetland and aquatic wildlife habitats and significant alteration of downstream habitats.	Existing atypical habitats would continue to exist. Floods exceeding the design criteria for this alternative could breach the dams and result in the same impacts to wildlife habitats that would be associated with Alternative 1.	Some species would be the temporarily displaced during construction and some insects and rodents may be lost. Atypical habitats would be replaced with habitat typical of other intermittent stream drainages in the area.
Visitor Experience and Park Operations	Visitors would continue to see unnatural and visually obtrusive structures in an otherwise pristine-looking montane ecosystem, although the pleasing pond behind Dam #31 would be retained. Failure of the dams would greatly diminish the aesthetic value of downstream areas and would limit visitor access to those areas.	The negative and positive impacts of the dams on visitor experience that currently exist would be retained. Floods exceeding the design criteria for this alternative could breach the dams and result in the same adverse impacts on visitor experience that would be associated with Alternative 1.	Temporary local adverse impacts to visitor enjoyment would result from the construction activities and limitations on access to those areas. These adverse impacts would be mitigated by the educational value of interpretive signs and exhibits.

V. CONSULTATION AND COORDINATION

History of Public Involvement

- Draft EA made available for public review; officially 9/20/00 – 10/4/00, but comments actually taken through February 2001
- On-site meeting with interested public on 9/27/00
- Meeting with interested public and technical experts on 1/24/01
- Scoping letter for revised EA sent to public on 6/4/01
- On-site meeting with interested public on 7/10/01

National Park Service Staff, Florissant Fossil Beds National Monument

National Park Service Staff, Geologic Resource Division

National Park Service Staff, Water Resource Division

U.S. Fish and Wildlife Service – Pete Plage

U.S. Army Corps of Engineers – Terry McKee

Natural Resource Conservation Service – Laura Craven

State Historic Preservation Office – Kaaren Hardy

VI. REFERENCES

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Wheaton, Rodd, 1993 Memorandum on file Florissant Fossil Beds National Monument.

Executive Orders

Executive Order 11988 (*Floodplain Management*)

Executive Order 11990 (*Protection of Wetlands*)

Executive Order 12898 (*Environmental Justice*)

Executive Order 13007 (*Indian Trust Resources and Sacred Sites*)

Executive Order 13112 (*Non-Native Invasive Species*)

Executive Orders 11514, 11991 (*Protection and Enhancement of Environmental Quality*)

Executive Order 11593 (*Protection and Enhancement of the Cultural Environment*)

US Federal Government

1906 Antiquities Act

1916 NPS Organic Act

1935 Historic Sites Act

1955 Federal Air Quality Law

1963 Clean Air Act, as amended

1964 Wilderness Act
1965 Water Resources Planning Act
1966 National Historic Preservation Act, as amended (16 USC 470 et seq.)
1969 National Environmental Policy Act
1970 NPS General Authorities Act
1972 Federal Water Pollution Control Act, as amended
1973 Endangered Species Act, as amended
1974 Archaeological and Historic Preservation Act
1977 Clean Water Act
1978 American Indian Religious Freedom Act
1979 Archaeological Resources Protection Act
1990 Native American Graves Protection and Repatriation Act
____ Fish and Wildlife Conservation at Small Watershed Projects
____ Forest and Rangeland Renewable Resources Act
____ Federal Land Policy and Management Act
____ Federal Noxious Weed Control Act
____ Fish and Wildlife Coordination Act
36 CFR 800.11
40 CFR, Part 503
49 CFR 31528

National Park Service, US Department of the Interior

NPS-2 (*Planning Guidelines*)
NPS-12 (*NEPA Guideline*)
NPS-28 (*Cultural Resource Management*)
NPS-83 (*Public Health Management*)
NPS-77-1 (*Wetland Protection*)
2001 NPS (*Management Policies*)
ECM95-2, SO3175 (*Indian Trust Resources*)

VII. LIST OF PREPARERS

W. Alex Birchfield - Florissant Fossil Beds National Monument, National Park Service
Tom Ulrich - Florissant Fossil Beds National Monument, National Park Service
Dave Steensen - Geologic Resources Division, National Park Service
Hal Pranger - Geologic Resources Division, National Park Service
Mark Bell - Roy F. Weston, Inc.
Marcella B. Johnson - Roy F. Weston, Inc.
Jack Sosebee - Roy F. Weston, Inc.

VIII. APPENDIX

FIGURE 1 – SEVEN EARTHEN DAM LOCATIONS [page 31]

FIGURE 2 – AERIAL PHOTOGRAPH OF SEVEN EARTHEN DAM LOCATIONS

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PHOTOGRAPH OF DAM #31 [page 33]

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FIGURE 1 – SEVEN EARTHEN DAM LOCATIONS

[scale is approximate]

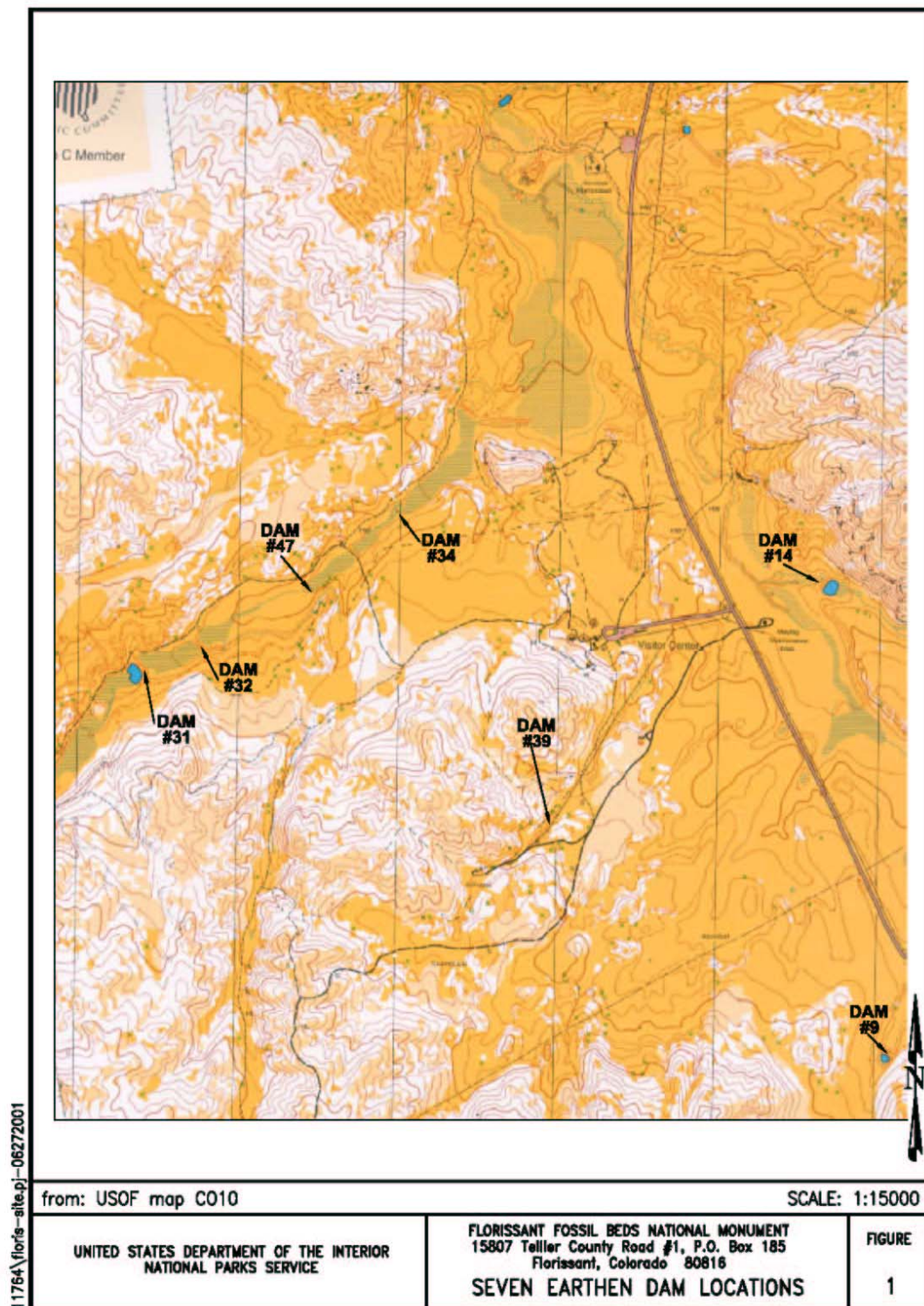
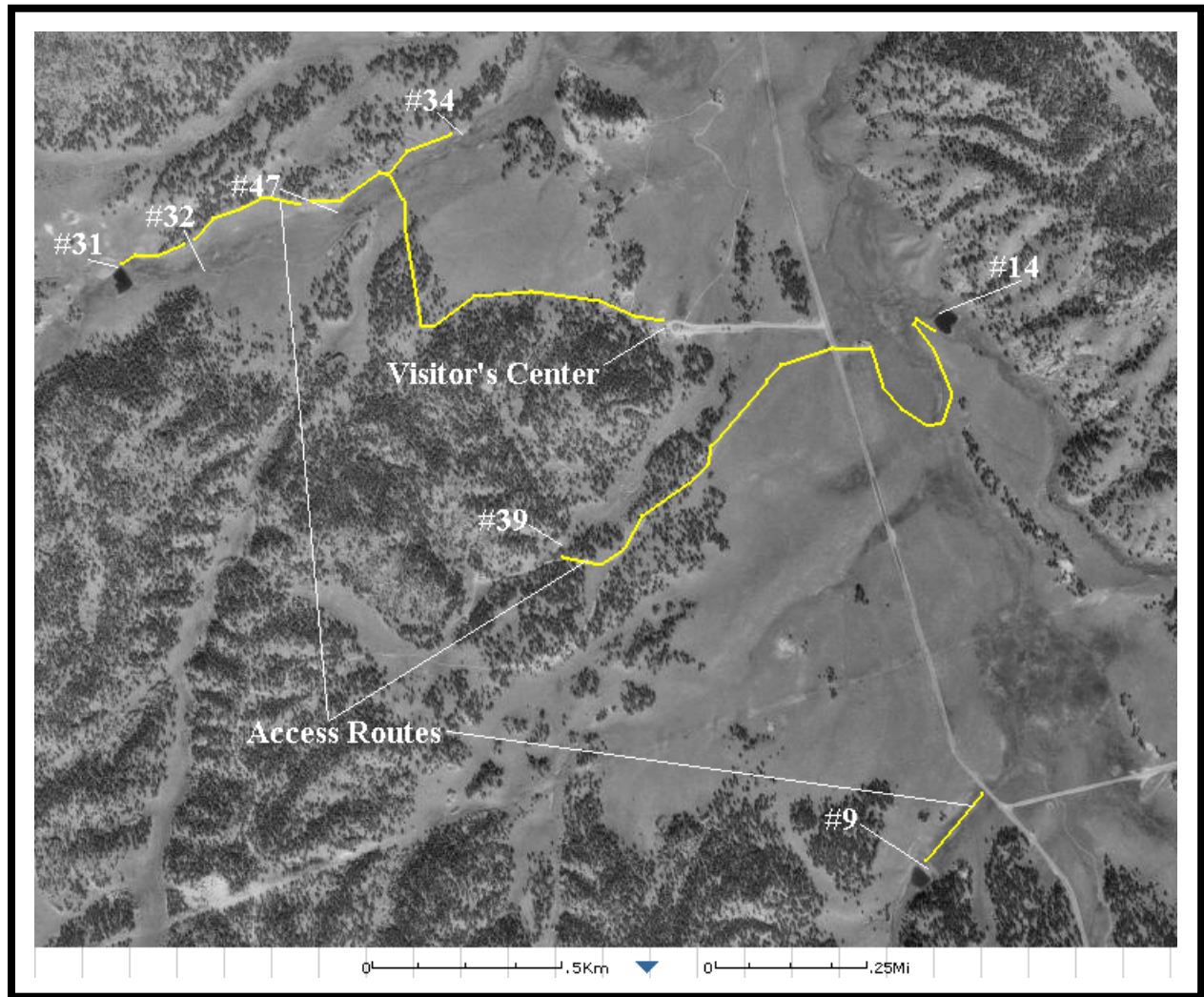


FIGURE 2 - AERIAL PHOTOGRAPH OF SEVEN EARTHEN DAM LOCATIONS



[scale is approximate]

PHOTOGRAPH OF DAM #31



[photo taken May 29, 2001]

View of dam #31 looking north down the drainage.
Note impounded water behind dam.

PHOTOGRAPHS OF DAM #32



(above) View of westerly arm of dam #32.

[photos taken May 29, 2001]

(below) View of northeasterly arm of dam #32.



PHOTOGRAPH OF DAM #47



[photo taken July 31, 2001]

View of dam #47 (transecting middle of photograph) looking northeast.

PHOTOGRAPH OF DAM #34



[photo taken May 29, 2001]

View of dam #34 (right foreground) looking north down the drainage.
Note resultant diversion in stream flow.

PHOTOGRAPH OF DAM #39



[photo taken May 29, 2001]

Looking north from top of dam #39 down drainage.

PHOTOGRAPH OF DAM #14



[photo taken May 29, 2001]

View of dam #14 looking east.

Note impounded water behind dam and flowing culvert.

Note scarification in foreground resulting from high water drainage route.

PHOTOGRAPHS OF DAM #9



(above) View of dam #9 looking southwest up drainage. [photos taken May 29, 2001]
(below) Looking north from top of dam #9. Note impounded water behind dam.



ARMY CORPS OF ENGINEERS LETTER [page 1 of 2]



DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, DENVER DISTRICT
DENVER REGULATORY OFFICE, 9307 S. PLATTE CANYON ROAD
LITTLETON, COLORADO 80128-6901

July 24, 2001

Mr. Thomas A. Ulrich
National Park Service
Florissant Fossil Beds National Monument
PO Box 185
Florissant, CO 80816

**RE: Removal of Dams 31, 32, 34, 47, and 14, Wetland Restoration, Grape Creek
Nationwide Permit No. 27, Corps File No. 200180510 (associated Corps File No. 200080611)**

Dear Mr. Ulrich:

We have reviewed the above-mentioned project located in the S ½ of Section 14, Township 13 South, Range 71 West, Teller County, Colorado.

Based on the information provided, this office has determined that the work within Colorado is authorized by the **Department of the Army Nationwide Permit No. 27**, found in the March 9, 2000, Federal Register, Final Notice of Issuance, Reissuance, and Modification of Nationwide Permits (65 FR 12818). Enclosed is a fact sheet which fully describes this Nationwide Permit and lists the General Conditions, Section 404 Only Conditions, and Colorado Regional Conditions which must be adhered to for this authorization to remain valid.

Although an Individual Department of the Army permit will not be required for this project, this does not eliminate the requirement that any other applicable Federal, state, tribal or local permits be obtained as required. Please be advised that deviations from the original plans and specifications of this project could require additional authorization from this office.

The applicant is responsible for all work accomplished in accordance with the terms and conditions of the nationwide permit. If a contractor or other authorized representative will be accomplishing the work authorized by the nationwide permit on behalf of the applicant, it is strongly recommended that they be provided a copy of this letter and the attached conditions so that they are aware of the limitations of the applicable nationwide permit. Any activity which fails to comply with all the terms and conditions of the nationwide permit will be considered unauthorized and subject to appropriate enforcement action.

This verification will be valid until July 24, 2003. In compliance with General Condition 14, the attached "Certification of Completed Work" form (blue) must be signed and returned to this office upon completion of the authorized work and any required mitigation.

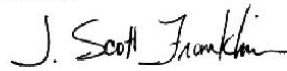
ARMY CORPS OF ENGINEERS LETTER [page 2 of 2]

The removal of Dams 39 and 9 will not require a Department of the Army permit.

Should anyone at any time become aware that either an endangered and/or threatened species or its critical habitat exists within the project area, this office must be notified immediately.

If there are any questions concerning this verification, please call **Mr. Terry McKee** at (303) 979-4120 and reference **Corps File No. 200180510**.

Sincerely,


for Timothy T. Carey
Chief, Denver Regulatory Office

tm

Enclosures

Copies Furnished:
U.S. Fish & Wildlife Service
Colorado Department of Public Health & Environment
Environmental Protection Agency
Colorado Division of Wildlife

STATE HISTORIC PRESERVATION OFFICER LETTER [page 1 of 1]



IN REPLY REFER TO:

United States Department of the Interior

NATIONAL PARK SERVICE
Florissant Fossil Beds National Monument
P.O. Box 185
Florissant, Colorado 80816

H4217 (FLFO)

July 16, 2001

Ms. Georgianna Contiguglia
State Historic Preservation Officer
Colorado Historical Society
1300 Broadway
Denver, CO 80203

Reference: **No historic properties affected:** Florissant Fossil Beds National Monument,
Compliance Project FLFO-01-01

Dear Ms. Contiguglia:

Florissant Fossil Beds National Monument proposes to remove seven earthen embankments and to restore the natural contours, hydrology, and vegetation at their locations. A survey of the area was conducted and no cultural resources were found. No historic properties will be affected by the project. The dams themselves have been evaluated and found to have no cultural significance.

Enclosed is the Assessment of Effect Form for the project. We shall cease all activities if any unknown archeological resources are encountered during construction and we will contact an archeologist for assistance.

Kaaren Hardy of your office has been very helpful with this project, and we thank her for her assistance. Please contact Tom Ulrich at (719) 748-3253 if you have any questions or comments.

Sincerely,

Tom Ulrich
for Jean H. Rodeck
Superintendent

Enclosure

bcc: MWAC w/copy of AEF
bcc: IMDE-CNR, Adrienne Anderson w/copy of AEF

Mark H. Rodeck
Concurrence, Colorado State Historic
Preservation Officer
for Georgianna Contiguglia
Date 7/19/01